# MICROELECTRONIC DEVICES WITH IMPROVED HEAT DISSIPATION AND METHODS FOR COOLING MICROELECTRONIC DEVICES

## ABSTRACT OF THE DISCLOSURE

Microelectronic devices with improved heat dissipation, methods of making microelectronic devices, and methods of cooling microelectronic devices are disclosed herein. In one embodiment, the microelectronic device includes a microelectronic substrate having a first surface, a second surface facing opposite from the first surface, and a plurality of active devices at least proximate to the first surface. The second surface has a plurality of heat transfer surface features that increase the surface area of the second surface. In another embodiment, an enclosure having a heat sink and a single or multi-phase thermal conductor can be positioned adjacent to the second surface to transfer heat from the active devices.